

25. (New) The apparatus of claim 23, further comprising a retention member for retaining a converging region of the filter portion.

26. (New) A surgical apparatus comprising a vessel filter having a first portion, a second portion and an intermediate portion between the first and second portions, the first portion increasing in diameter from the intermediate portion towards a first end, and the second portion increasing in diameter from the intermediate portion towards a second end, a region closer to the intermediate portion forming a filter portion, and an anchoring portion formed at the first end and second end, an end region of each anchoring region converging to form a converging section spaced from the filter portion.

27. (New) The apparatus of claim 26, further comprising a connecting element at each converging section.

REMARKS

Applicants affirm the election of claims 1-13 as requested by the Examiner. Claims 14-18 have been canceled without prejudice. Minor amendments have been made to the specification to conform to the drawings. No new matter has been added.

Claims 1, 2, 4 and 7-13 were rejected under 35 U.S.C. 102 as anticipated by U.S. Patent No. 5,370,657 to Irie and U.S. Patent No. 5,746,767 to Smith.

Claims 1-14 were rejected as anticipated by U.S. Patent No. 6,251,122 to Tsukernik.

Claims 3, 5 and 6 were rejected as obvious over U.S. Patent No. 5,746,767 to Smith.

The Smith patent discloses a thrombus filter having first and second units 12, 14 having a plurality of struts 16, each having a free end 18 and a joining end 20. The joining ends are joined by respective hubs 22 and 24 which are fastened together by coupling 26. Struts 16 of first unit 12 radiate from hub 22 away from the longitudinal axis of the filter and longitudinally in a direction toward hub 24. Struts 16 of second unit 14 radiate from hub 24 toward hub 22 such that the free end of the struts of the first and second units extend in opposite directions. The sharpened portions of the strut free ends penetrate the vessel wall and pads 21 at the free end limit the extent of penetration.

Claim 1 of the present application, as amended, recites that the transverse dimension of the first filtering portion in an expanded configuration is less than a transverse dimension of the first anchoring portion in an expanded configuration, an end portion of the first anchoring portion spaced from the first filtering portion converges to a first converging section, a transverse dimension of the second filtering portion is less than a transverse dimension of

the second anchoring portion, and an end portion of the second anchoring portion spaced from the first filtering portion converges to a second converging section. The first and second filtering portions are recited as positioned closer to each other than the first and second anchoring portions and the anchoring portions are formed on first and second opposite portions of the vessel filter

Smith does not teach or suggest this feature. The struts 16 of the Smith filter radiate outwardly and the anchors terminate in free ends. This is in contrast to the first and second converging sections of the end portions of the respective anchoring portions of claim 1. This convergence increases the radial strength of Applicants filter to better prevent unwanted migration of the filter. Smith's anchor portions cannot converge because they terminate in sharpened portions to penetrate the vessel and terminates in pad portions 21. If the free ends converged they would not function to penetrate. Applicants respectively submit claim 1 patentably distinguishes over Smith and the rejection should be withdrawn.

Claim 9 recites inter alia that the vessel filter has a region closer to the intermediate portion forming a filter portion and a region further from the intermediate portion forming an anchoring portion, wherein elements of the anchoring portion extend radially distally in a first direction and bend back to extend proximally in a second direction. No such structure is disclosed or suggested in the Smith patent where the struts radiate outwardly. If the Smith struts bent proximally then the penetrating members at the free end would not function. Applicants submit that claim 9 is not anticipated by Smith and the rejection should be withdrawn. Note that this structure of Applicants' invention of claim 9 increases the stability of the filter.

Independent claims 1 and 9 likewise are not anticipated by the Irie patent. The Irie patent discloses a filter made of two units connected by a coil compression spring 48. The struts 40 and 41 radiate from central hubs 44 and 45 and have bent junction portions 43 which are parallel to the vein wall. Short section 53 of the free ends are bent inwardly to avoid piercing the vein wall. The struts terminate with free ends. Anchor legs 54 of Unit II radiate at the same angle as the struts and have vein penetrating pick portions 55.

The Irie patent is deficient for the same reasons as the Smith patent. The struts of Irie terminate in free ends and the Irie filter lacks the converging sections of the end portions of the anchoring portions of claim 1. Irie also lacks the elements of the anchoring portion extending radially distally in a first direction and bending back to extend proximally in a second direction as in claim 9. The Irie struts fan out radially. As noted above, the structure of the present invention of claims 1 and 9 reduces the chance of migration of the filter. Thus, claims 1 and 9 patentably distinguish over Irie as well and the rejection should be withdrawn.

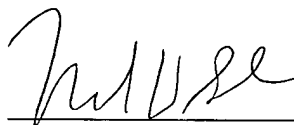
The Tsurenik patent is deficient for similar reasons. Tsurenik discloses a filter having strands 32 of a first strand formation and strands 42 of a second strand formation 40 which radiate in generally opposing directions. The strands have a joined end 34, 44 and a free end 36, 46. Anchors 62 are disposed at the free ends. A collar 52 is disposed about joined ends 64 of strands 42 and sliding member is disposed about joint portion 50. The Tsurenik patent does not anticipate claim 1 as it lacks converging sections of the end portions of the anchoring portions. The elements in Tsurenik terminate in free ends. Tsurenik also does not anticipate claim 9 which recites elements of the anchoring portions extending radially distally and bending back in a different direction. Tsurenik strands extend radially and longitudinally distally. Thus, the rejection of claim 1 or 9 as anticipated by Tsurenik should also be withdrawn.

Claims 2-8 and 10-13 depend directly or indirectly from claims 1 or 9 and are therefore believed patentable for at least the same reasons as claims 1 and 9 are believed patentable. New claims 19-27 have been added. Claims 19-25 depend from claims 1 and 9. Claim 26 is a new independent claim reciting inter alia converging sections of the anchoring portions. New claim 27 depends from claim 26. These claims are also believed allowable over the prior art.

Applicants respectfully submit that this application is now in condition for allowance. Prompt and favorable reconsideration of the present application is respectfully requested. The Examiner is invited to contact the undersigned should the Examiner believe it would expedite prosecution.

Respectfully submitted,

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MARKED UP COPY OF AMENDMENTS

IN THE SPECIFICATION:

On page 8, the paragraph beginning on line 1 has been amended as follows:

As can be appreciated from Figures 1-2, the wires 12 and 14 are wound in identical manners, except opposite to one another. That is, wire 12, starting from proximal crimping sleeve ~~224~~ 22, weaves back and forth across an imaginary centerline "C" (or central longitudinal axis) to form a series of loops 12b, 12d, 12g, 12i and 12k, on one side of the centerline. Bends or curves 12a, 12c, 12e, 12f, 12h, 12j and 12l are on the other side of the centerline and form transitions for formation of the loops in wire 12. Each of the bends 12a, 12c, 12e, 12f, 12h, 12j and 12l faces in the downward direction enabling each of the loops 12b, 12d, 12g, 12i and 12k to open in an upward direction as oriented in Figures 1 and 2.

On page 9, the paragraph beginning on line 13 has been amended as follows:

In the illustrated embodiment, the anchoring portion 30, which includes the region between the intermediate and proximal crimping sleeves 24, 22, is substantially uniform in diameter (D1) or height. The filter portion ~~20~~ 28, which includes the region between the intermediate sleeve 24 and the distal crimping sleeve 20, progressively decreases in diameter towards the distal sleeve 20 from diameter D2 to diameter D3. Consequently diameter D2 of filter portion ~~32~~ 28 is greater than diameter D3 of filter portion ~~20~~ 28. This decrease in diameter helps to cause migration of the blood clots towards the center of the filter 10 to facilitate dissolution by the blood flow. Thus, the region between the drawn diameters D2 and D3 functions as the filtering portion. As noted below, it should be appreciated that the anchoring and filtering regions are not rigidly defined and the diameters D2 and D3 and the portions 30 and 28 are identified for convenience.

On page 11, the paragraph beginning on line 17 has been amended as follows:

Figure 6B shows the diameter of the two wires within the crimping sleeve 22, with the total cross sectional region occupied by the collapsed filter defined by the outer diameter ~~D6~~ D8 of the sleeve 22. A slight gap between the outer diameter of the crimping sleeve 22 and delivery sheath 210 is designated by reference letter "g".

On page 14, the paragraph beginning on line 1 has been amended as follows:

With initial reference to Figures 9 and 10, filter 100 is formed by three wires 112, 114 and ~~116~~ 110. The three wires 112, 114 and ~~116~~ 110 form first and second anchoring portions 102, 104 and first and second filtering portions 106, 108. The first filtering and anchoring portions 102, 106 extend between proximal crimping sleeve 120 and intermediate (central) crimping sleeve 124; the second filtering portion 108 and anchoring portion 104 extend between intermediate crimping sleeve 124 and distal crimping sleeve 122. Anchoring portion 102 is substantially identical to anchoring portion 104, except it extends in the opposite direction. Similarly, the filtering portion 106 is substantially identical to filtering portion 108 except it also extends in the opposite direction. By providing two symmetrical portions, the filter can be placed inside a delivery catheter and inserted either through the jugular vein or the femoral vein using the same delivery catheter and in either proximal/distal orientation.

On page 19, the paragraph beginning on line 6 has been amended as follows:

In the alternate embodiment of Figure ~~25~~ 12D, a series of anchoring tubes 140 on the distal portion and proximal portion of each wire engage the vessel wall.

Claims 1 and 9 have been amended as follows:

1. (Amended) A vessel filter comprising a first filtering portion and a first anchoring portion, a transverse dimension of the first filtering portion in an expanded configuration being less than a transverse dimension of the first anchoring portion in an expanded configuration, and an end portion of the first anchoring portion spaced from the first filtering portion converging to a first converging section, and a second filtering portion and a second anchoring portion, a transverse dimension of the second filtering portion being less than a transverse dimension of the second anchoring portion, and an end portion of the second anchoring portion spaced from the first filtering portion converging to a second converging section, the first and second filtering portions being positioned closer to each other than the first and second anchoring portions, and the anchoring portions being formed on first and second opposite portions of the vessel filter.

9. (Amended) A surgical apparatus comprising a vessel filter having a first portion, a second portion and an intermediate portion between the first and second portions, the first portion increasing in diameter from the intermediate portion towards a first end, and the second portion increasing in diameter from the intermediate portion towards a second end, a region closer to the intermediate portion forming a filter portion and a region further from the

intermediate portion forming an anchoring portion, wherein elements of the anchoring portion extend radially distally in a first direction and bend back to extend proximally in a second direction.

Claims 19-27 have been added.